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THE CLASS STRUCTURE OF MACHINERY: NOTES ON THE VALUE FORM

ECONOFICTION, LEXICON, MASHINES MARX, MARXISM, TECHNOLOGY

The historical development of the means of labour (Arbeitsmittel) as the transformation through labour of nature-given forms into the socially purposive forms of the labour process is simultaneously the 'naturalization' of the social forms of instruments of use (Gebrauchsmittel). As a material thing, the means of labour not only mediate between nature and subject of labour, but also serve as the mediation, the 'means', among those who carry out labour. The fact that the tool can only serve the function of mediating the living relationship among workers if this living relationship is simultaneously severed is the reason why – in the form of private property – it can also 'mediate' a social relationship between workers and non-workers, or between different types of labour. If the means of labour, as means of production, come to mediate between the ruling and the subordinate class, they must acquire a dual social character in the course of their historical development: the means of labour are a means by which the ruling class can directly satisfy its wants, but they are also the 'purposive basis' for perpetuating the one-sided relation between worker and non-worker. As a means, therefore, the tool not only stands between nature, history and society, but also between different classes in society: it is not merely the means, but in fact the purposive basis for one-sidedly uniting the subject of labour with the subject of appropriation. Hence, the genesis of the means of production, as this objective basis, is in fact the process of mediation of two asymmetrical social subjects.

Bourgeois science perceives the fact that the ensemble of means of labour results from the objectification of these dialectical forms of the living relationships of labour merely as archaeology; this follows from its method of reasoning backwards from the result, the product, to the living social formation. For example, it concludes from certain snares and fishing hooks – in contrast to hunting projectiles such as spears – that a particular tribe was on the verge of stable settlement; specific types of stone-drills, require complex and painstaking manufacture, indicate more enduring forms of the division of labour. The once-existing living form of particular social relations and structures now resides in the tangible and symptomatic form of the ensemble of nature-given materials changed by the action of social labour. That archaeology does not turn its criteria around and apply them to its own material basis but confines itself to pre-/non-bourgeois social orders is part of its brief: there shall be no archaeology of the systems of bourgeois means of production.

The developmental form of present-day means of production are more and more mediated through scientific labour. We can

specify this relationship a little more precisely by noting the following: although it is well known that manual labour creates the means to transform nature-given forms into socially purposive forms, curiously little consideration is given to the fact that scientific labour differs from the former only in terms of the form of the means which it creates for the production of its knowledges. Even the critiques of the pure deductive sciences are in general less concerned to criticize the possibility of such scientific purity than to question its actual tenability in practice. Historically, the beginning of the deductive sciences coincided with the empirical production of tools, models, drawings and symbols as the means for the supposedly pure, i.e. uncontradictory, expansion of knowledges; these means include (as collective memory), along with language, writing and mechanical printing, and numerical and data processing.

Although experimental scientific equipment was a precondition for the technologization of production, it was – as Sohn-Rethel correctly points out – not the latter's active source. Neither the spinning-jenny and mechanical loom, nor the steam-engine arose in direct connection with either the discoveries or technical apparatus of theoretical physics. On the other hand, the pre-scientific structure of machinery – as it existed prior to the development of chemical techniques and industrial application of electricity – represented a form of development which exhibited more than the 'personal unity of intellectual and manual labour' that Sohn-Rethel claims for handicraft implements. As means of labour, simple mechanisms already possessed a structure which machinery, as the purposive basis of the capitalist labour process, simply made more apparent: namely the two poles of 'drive' (power) and 'tool' (mechanical construction), which are in turn directly mediated through the transmitting mechanism. Language has kept alive in its concepts what now only appears in material form: for expenditure of labour power as the moving force, read drive; for skill and dexterity as the purposive essence of the social transformation of nature wrought by mental and practical activity, read tool. And the transmitting mechanism could well be interpreted as the naturalized form of intercourse among the workers themselves; or, in historical terms, the ossified form of intercourse could be interpreted as the mediation between the plebeian and peasant-handicraft form of labour, in which – in addition to the prevailing class antagonisms – there also lurked an incipient antithesis between the intellect and the increasing abstractness of the nascent proletariat's labour power. In this instance, the tool would correspond to the intellect, and the mere driving force to the proletariat, as labour power deprived of its skill, although the mediation of the two moments, inasmuch as it still lay with the handicraft workers themselves, was direct.

What this allusion is meant to indicate is that the instruments and the very basis of the scientific production of knowledge only became a condition for the development of the mechanism (via the stages of machinery and mechanization up to automation) because the social organization of living labour conditions had already assumed a 'rational', i.e. mathematical form which could therefore become the foundation for a systematic scientification (Verwissenschaftlichung) of the production process.

This mediation between scientific and proletarian labour, anticipated in handicrafts, and later to assume its own independent and objective form in machinery, in turn points to a third factor underlying these two forms of activity, which despite a historically uneven mode of appearance constitutes from the outset the possible common factor: the immanent value-form of the means of production, as 'abstract natural form', or as abstract social purposiveness in the ossified form of nature-given material. The following descriptions are initially intended to sketch the development of the mechanical and technological 'means of labour' in terms of their surface appearance; this is a prerequisite for the deeper question of the development of inner form as (class-determined) structure and external form as (instrumental) shape, and of their unity as function.

SURFACE APPEARANCE

The social nature of the relations of production, which, historically, only appeared in the first instance in the form of generalized exchangeability, becomes essential or real only in the living act of cooperation, where individual concrete labour is actually reduced to abstract average labour. "The law of valorization", writes Marx, "comes fully into its own for the individual producer only when he produces as a capitalist and employs a number of workers simultaneously, i.e. when from the outset he sets in motion labour of a socially average character [our emphasis – H.D.B.]."

Cooperation, which according to Marx remains the basis of industrial production, consists initially of a purely quantitative aggregation of handicraft units in which the direct means of labour remain the property of the worker. The initial form of constant capital for increasing surplus labour appears as the method of attaining a merely external generalization within the existing division of labour in the workshop; however, this nevertheless takes on a qualitative dimension – such as increased scale of workshops, stores and internal means of communication. These means, or, better stated, these bases, as they exist in their actual shapes, must be seen as the material results of specific living relations of labour; they are in fact the basis for the possibility of handicraft workers being able to work together in larger groups. Elements of feudal landowner and guild-master fuse – most noticeable in the mining and mills – into a type absolute bourgeois patriarchy over the journeymen.

In cooperation, the mechanical activity of the hand in working up and structuring materials increases merely quantitatively. In contrast, manufacture breaks down aggregate labour into detailed operations, which brings about a qualitative transformation in the relation of the worker to the object of labour: means of labour develop which increasingly reduce skill, i.e. manual dexterity and intellectual know-how, to the level of an abstract expenditure of force. This separation of the intellect of labour from the expenditure of labour power then becomes a necessary condition for the rise of the scientific-technological intelligentsia.

The external form of a merely quantitative increase in the number of workers finds its corresponding inner form in the deskilling

of labour power as the precondition for collectively raising the abstract expenditure of force to a higher power. The 'body' of the collective worker precedes the appearance of machines for supplying motive power. The dissolution of the inner union of the labouring subjects and their skill alters the relation between the object of labour, which is to take on a new form, and the final result of the change wrought in the material, the product: the object is no longer a product in direct reference to the individual subject of labour, but only in relation to the individual capital. Even in quantitative cooperation, many objects of labour were simultaneously worked up alongside each other until the completion of an object of use in the hands of the master craftsman; but in manufacture, the object of labour passes through a series of stages (preparing, altering, shaping the material), which itself presupposes that the raw material can be dismembered and reconstituted, the final stage being a new assembly of the materials. However, the transmission of these partial operations (excluding chemical or electrical labour processes) remains external and indifferent to the product being created; in other words, the product does not take on their form. Transmission consists of a non-mechanical form of transport for raw materials within the workshop, together with the communication of directions and instructions. In this context, speech is not so much aimed at passing on understanding, as 'semiskilled' in fact means converting understanding into manual dexterity; rather, as long as the labour process is running smoothly, speech serves simply as a set of directions for ensuring that specific partial operations on the object of labour are always carried out in the same way, i.e. uniformly. (Natural science later defined its own labour process in accordance with this model, i.e. as operational and experimental: the experiment should always yield the same result, under identical conditions, in order to produce a 'valid' conclusion or result on the object of research. Terminology itself here reveals the close affinity between natural-scientific labour and the increasingly abstract natural form as value-form.) Uniform motion, which already appeared in the demands made on time-measuring instruments or on static and dynamic mechanics (exemplified in construction work, or in the machinery of agrarian mills), is an expression of the fact that a nature-given material marked out as 'analytic' by the type of social labour, i.e. a material divided and dismembered by the division of labour, assumes a 'real' value-form contradicting not only its nature-given form but also its useful form. The reason is that the asserted (but never realized) formal equality of movements in the labour which produces commodities can be seen as the same type of equivalency of form that in the value-relation appears as the equivalent form of value. This question is discussed more fully in the second section.

The qualitatively new form of societation which comes into being with manufacture creates the living cooperative collective worker as an organically structured whole (an analytical synthesis) in which what had been a merely quantitative aggregation becomes a qualitative social unity. However, the form of societation tends simultaneously to bring about the negation of the direct collective worker in the workshop, primarily through the specialization of activities and the splitting-up of complex handicraft implements. The machine-tool is then the first transcendence of this acute specialization, namely by combining within itself a series of separate individual tools such that they no longer require the mediation of human labour. 'Combination' here means that collective labour, the living cooperation of a number of specialized workers, disappears as such, to be stored as the 'natural form' of a higher mechanical power. The objectification of specific social relations of labour corresponds to the de-objectification of living collaborative labour; this is expressed in the antithesis between the isolated specialized worker and the technological collective worker.

With the objectification of subjective labour conditions – which, as the machine-tool, forms the purposive basis for the industrial labour process – the worker is initially reduced to the function of pure motive force. The inversion of the relation between worker and tool (through which the body's simple physical power was transformed into the stationary mechanism driving the machine tool that actually shapes the material) leaves living labour with the cooperative organization of pieces of work. In this role, abstract labour power functions as the 'motor' force, as the living transmission, in addition to its function as a stationary motive force. In this usage, 'living' means that the object, the purposive condition, the means and the subject's purposes still constituted a simple, unspecialized unity in relation to the labour process, from which it still appeared possible to determine and realize the very aim of labour by way of anticipation. Under the conditions of the class-based separation of labour power from the means of production, 'objectification' means that although there is a work-shop unity of purposive conditions (object and means of labour) and means to ends (the labour power to be valorized), the process is 'rational' (rational) only in the sense of 'mathematical' (rationell). In fact, there is a general social antagonism between the determination of the ends to which the labour is being put and the initial unity mentioned above, an antagonism which reacts back upon the form of development of the conditions of production. 'Living' cannot mean a secret desire to return to handicraft activities, since handicraft labour only permitted the vague utopia that it could give rise to a social subject as subject in conjunction with artistic labour.

The translation of the transmission and motive force of human beings in collaboration into 'natural' forms is the condition for the possibility of machinery; the rise of machinery was itself only possible because decisions as to the goal of labour (the production of the bourgeois class by capitalist means) remained totally external to the labour process itself as a mere functional condition, that is, as a 'sublated' (aufgehoben) means for the 'simple' satisfaction of needs: one social class had to be completely divorced from the final determination of ends before the social forms of labour could become more 'rational', i.e. 'subjectless', and consequently assume a purposive natural form as machinery. In this form, the direct social rationale of the labour process ceased to have a subject, and became irrational (although this lack of a subject is the necessary condition for the liberation of social reason from its blind natural shape). Machinery is precisely the clear proof (once the genesis of its dual social form has been incorporated into the critique) that in the labour process bourgeois society exists without a real subject and consequently confronts nature as itself a simple 'force of nature'. This explains why the working class first had to become politically conscious, and therefore an ideal (ideell) subject, before the possibility of actualizing the social subject within the labour process could

appear. At the same time, this 'ideality' of the proletariat's existence as a subject – incorrectly posited as real by Lukács in *History and Class Consciousness* – also constitutes from the outset a permanent tendency towards the de-revolutionizing of the working class, since its interest in production is not produced through the latter, but is obliged to become a political idea before it can produce its own material basis spontaneously. 'Revisionism' is therefore a significantly more serious problem than as registered in the various versions of the conspiracy theory.

On the other hand, the labour process based on machinery (where the worker retreats from activities which directly give form and shape to the material) itself assumes a more 'ideal' character: it, as it were, offers itself to the prospect of 'politicization' from within. Expressed in technological terms, living labour activity becomes confined to assembly, which is usually located at the end of a series of machine-worked partial operations. The worker is therefore confronted by the material in a socially nature-given form, whilst the directly nature-given form turns into an aesthetic object, becomes 'scenery'. The object – as a prospective commodity – is no longer wrested from the nature-given material, or at least so it appears to the individual consciousness; rather, elements of raw material that have already been pre-formed and pre-structured by a mystical subject and the which thus appear as objectively social are constructed, assembled, fitted, inspected and regulated. The transformation of work activity into the activity of assembly, transport and coordination was the condition for the invasion of the engineer into industrial labour. Prior to this, the engineers had proven themselves historically in the sphere of military science and practice, the field in which the bourgeois society had anticipated the generalization of production through the 'rationalized' organization of destruction, and in particular, the unilateral appropriation of social wealth; as an economic subject collecting taxes militarily, the bourgeois state formation displays this 'one-sided' form of rationality. In contrast to the undifferentiated homogeneity of direct handicraft work on materials, the mechanical technology of construction allowed the pre-planning of coordination, transport and assembly operations. Consequently, using machinery as its purposive basis, the production process as a whole inevitably had to change the character of work activity (which had previously had a directly determined relation to nature) before the splitting of the production process into its ideal and real components could take place: i.e. operational and technological planning on the one hand, and individual realization through physical labour on the other. This change was achieved through practical analysis and simplification (deskilling). At the same time, planning became the inner-plant price-form-in-process, i.e. the ideal form of the measure of value, while its objectification in proletarian labour constituted the genesis of constant capital as machinery. Machinery is not therefore an application of theoretical mechanics to production; rather, it was the development of quantitative relations out of living cooperation which became the a-priori of machinery. Hence, it is the form of constant capital which constitutes the real mediation of natural science, its operational rationality and the degree of societation of labour in the production process; the technical face of the mediation (the organic composition of capital) consists in the technologization of production.

However, this process of mediation only becomes apparent when this relation of science and industrial labour begins to turn into its opposite, i.e. in the chemicalization of production, where the process changes from working up already existing materials to the creation of qualitatively new ones. At this point, the production of scientific knowledge and its instruments in laboratories and planning departments begins to function as the active moment in the generalization of production, a process in which 'scientification' is at the same time a kind of ideal societation; that is, the 'scientification' of production becomes a fundamental moment in the power of the actual form of societation, whose other moment consists of the external forms of realizing surplus value.

Machinery sets free an intellect formerly bound to the feudal-handicraft labour process, an intellect which carries the possibility of forming a political collective worker out of the divided partial workers. In contrast to the work ethic of the guild, the political cooperation of wage-workers comes into external opposition to production as such, since the social ends of production confront the proletariat as an external force, i.e. as the ruling class. The levelling down of the specialized workers by means of production technology creates the condition for turning the wage-struggle into the potential political socialization of a working class in the process of organizing itself. On the other hand, the contradiction between the specialized worker and the technological intellect responsible for the direction, construction and transmission of the isolated detail operations, prevents the working class from recognizing its own social character in this intellect, which in fact represents its own intellect, even if in the form of an unconsciously collective product alienated from the working class and acquiring independent shape in the form of planners, technicians and engineers. The proletariat therefore stands in outward opposition to its own intellect, which the capitalist process of production has created in formal independence. In part, it was this hostility which weakened and nullified the resistance of the working class to fascism. In addition, the absence of a practical-theoretical critique of the productive intellect blinkers the working class, binding it as a variable moment to the aggregate social capital; in this respect, the working class is merely an antagonistic, but nonetheless fixed component of bourgeois society. Its blindness towards its own, but alienated, intellect means that it contributes to the maintenance of the false totality of this society. And a 'liberation' which takes place behind the backs of the producers posits freedom as mere ideal.

The uniformity of the partial operations, as the commodity-form-in-process within the workshop, also became the condition for flow production; this initially took the material shape of industrial standards for individual pieces of work. Subsequently, in many cases, the individual factory no longer needed to produce commodities as 'use values' for subjects; the individual parts of the product cease to possess any direct social use value, and are 'utilizable' only for the possible (but no longer necessary) assembly of individual objects into use values. This assembly is itself mediated through the capitalist market, and can therefore be thwarted

by crisis: should difficulties arise in realizing the surplus value produced, these partial use values collapse into objects having no meaning. Such a contradiction encourages the formation of cartels: the standardized component part is the appropriated and objectified form of the universal exchangeability of use values – not as price, but rather as the natural form of commodity capital. Bourgeois consciousness only comes face to face with this process in the repair trade, namely as the interchangeability of components which are useless in themselves but nevertheless still commodities.

With the standardization of component parts, even assembly loses the character of being a constructive activity. Complex forms of assembly-line, with intervening semi-automatic machine tools, 'construct' the object, mediating the individual operations of the production process. The need to set norms for the performance of the work-force itself dismembers the human body into abstract functions: the bodily organs – defined by the logic of modern medicine – themselves take on the abstract form of nature, the fully adequate substrate of the value form. Only now does the bodily organism actually become 'pure' value form in itself. The training of the organs for certain extremely specific functions renders the body as a whole clumsy: it loses its integral function as the creator of use value. In addition, an ever-increasing period of formal training and retraining becomes necessary, even for unskilled workers. The one-sided expenditure of force and skill by individual limbs and sense-organs destroys the functional unity of the individual's body: individuals cease to be an instrument of use to themselves even in work activity. At the same time, capital seeks to profit from this loss of bodily unity through 'leisure activities', medicine and sport.

With the objectification of assembly work, packing, delivery, storage and transport into machine-based mechanisms, the machinery described by Marx is reduced to a mere moment of technology, in which the industrial production-process itself assumes circulative forms, just as the circulation of commodity capital is industrialized. Industrial and commercial capital fuse via the functional role played by financial capital. Nevertheless, the stage of mechanical technology remains overwhelmingly characterized by factory labour; the regional concentration of the means of production is still the basis of spontaneous forms of mass struggle, in which the trade-union types of organization and political groupings can, at this relatively low level of development, still overlap to a great extent. However, mass communications based on technology take on increasing significance as means for artificially resolving the 'ideality' of the collective worker. This also marks the beginnings of bureaucratization: necessarily, but nonetheless incorrectly, the organized workers build up the cadre as a distinct form for their own implicitly revolutionary intellect, a form which often begins to blindly follow its particular inner contradiction of wishing to conserve the revolutionary movement without knowing how to constantly revolutionize this work of conservation.

With the industrial application of electricity, traditional machinery begins to dissolve, or, rather, to encroach on the familial and even joint-stock spheres of capitalist private property. The state, as an abstract but underlying unity, gains in significance as a particular form of the aggregate national capital. The distribution of energy, that is, of the 'objective motor forces', undertaken by the state, takes on the role of providing the mutually exclusive individual capitals with their fundamental connection – a process which had already started with the nationalization of the communication, transport and education systems. With the transfer of power-generation away from most factories, machinery becomes 'supra-plant': machines which supply motive power grow into the independent power station. The previous network of canals, roads and railways is expanded and extended through more 'ideal' means of communication, such as pipelines, cables and radio waves. In supra-plant terms, the individual factory is assigned to the function formerly carried out by the machine tool: in contrast to the steam engine, the motor is an almost transmissionless moment in the drive of the machine tool. At the same time, the direction of the linguistic means of labour or of measurement and guidance systems in telecommunications also begins to turn into a technological form of the internal and external mediation of production, confronting the proletariat with its own intellect of earlier collaborative labour in a total estranged form, and hindering spontaneous and mass forms of communication. A critique of trade unions and parties has yet to make this development really clear – a task of increasing importance since the first signs of the dissolution of the massified worker into work groups, gangs and teams can quite spontaneously lead to a renewed guild or professional type of organization rather than a class organization. Ritual allegiance to increasingly inadequate mass organizations of the working class leads on the one hand to merely 'representing the interests' of the commodity labour-power, and on the other to the further provincialization of the proletariat. This process is further encouraged by capitalist urban construction: with the rapid industrial urbanization of the countryside, the real social growth of towns, as it began at the end of the Nineteenth Century, can itself stagnate as a mere 'sprawl'.

The development of high and low voltage engineering meant that principles of production (extension of surplus labour time through reduction of necessary) could also seize hold of the sphere of the reproduction of labour power. The technologization of domestic labour not only released the labour power of the woman, but above all allowed the indirect extension of the working day, as the long time workers spend travelling is unpaid. In general, the wage of the worker no longer cover the reproduction costs of domestic labour power; should a member of the family become unfit for work, state welfare has to intervene. Unbelievable physical misery is caused by the fact that capital has clearly destroyed the communication among members of a traditional small group (even if, as the family, this was a simple outgrowth of nature), and yet has artificially and formally kept this group together through the activities of state capital and the capital of the construction sector. The reverse side of the technological objectification of social powers is that living relationships, including even affective and sexual relationships, can only be conveyed and interpreted in mechanical terms.

High and low voltage technology offers the clearest proof of the problem which arises when production is generalized solely through these processes of objectification. Workers' councils in those places where workers also possess political power as a

class can be both a first step in the reunification of consumption and production (work, need and interest consciously constituting society), as well as a form in which contradictions within the social division of labour beyond the individual factory level can spontaneously solidify into competition within the working class. This in turn necessarily produces a bureaucratic centralization which dictates an external cohesion to such self-managed units.

A counter-tendency to the process of division and sub-division in the sphere of mechanical technology can be found in the machine-tool and vehicle-building industries, although its principal field of operation is those branches which undertake the chemical processing of raw material, or where chemical techniques are introduced into other branches of production. Whereas the activity of forming and structuring materials first acquired objective structure via mechanization (in its broadest sense), only in a few rare instances could changes in the inner forms of raw materials be obtained through the mechanical expenditure of human force. As a consequence, those processes which change and transform materials underwent a much lower degree of decomposition into individual part-operations than those which shaped matter, and the tendency to relegate the mechanical aspect itself to a subordinate, intermediate moment of production arose here much earlier. Moreover, it developed less out of the nature of the tool than out of the necessity of isolating people from certain phases of chemical transformation. For this reason, the monopolization of capital found a favourable 'natural form' here, since in terms of the outlay on constant capital there was a high raw material intensity of production, i.e., a rapid turnover of circulating capital relative to the small amount of value transferred from the fixed capital. Since in many instances it was the scientific analysis of the inner characteristics of natural substances which first made new materials possible, the laboratory soon became an integral part of the chemical industry: scientification not only of the means of labour but of the object of labour itself was – to an even greater extent than in the electrical industry – an absolute priority. Many processes could only be carried out automatically. In the chemical industry, particular moments of mechanical technology became the characteristic basis. The 'drive mechanism' was necessary, partly for processing the material, but also as an inner moment in the actual process of chemical bonding; in contrast, transmission mechanisms and tool elements fused into one, as in the elements for lift, drive and bonding, and in parts such as pipes and storage systems through which materials flow. The characteristic abolition of the differences between object and means of labour is already evident in the internal parts of the steam engine (for the flow of steam and gases), as indeed it is in all forms of equipment in which physical, chemical and biological processes are combined. The synthesis of object and means of labour finally reveals that the means of production are no longer a means for the workers, that they are no longer their 'instruments', but simply the autonomous purposive basis for specific forms of labour, in which the form of activity producing use values begins to diverge from the form creating value. The autonomization of the process of valorization, such that it produces its own structures of labour (which can only yield use value through the mediation of the market), expresses itself 'ideally' in the tendency towards the fusion of a nation's capitals into a quasi-state organization for administering the totality of social life. In this sense, the fascist 'folk community' (Volksgemeinschaft) was not only an ideology, but also a real integration of large sections of society into the slave-like organization of the conditions for valorization – an integration that in part was accomplished in total disregard of actual class divisions.

The characteristic feature of techno-chemical production methods is not so much machinery itself, but the thoroughgoing union of machine and apparatus; the assembly process takes a back seat to the activity measuring and regulating the continuous flow of a production linked by pipes, fed by storage reservoirs and united through the reactions which subject the material to chemical change alongside the mechanical forms which transport the commodity-object as it comes into being. In contrast to the historical forms of changing raw materials (e.g. smelting), in chemical production the various forms of motion and their transformations, together with the means, skill and object of labour, are fused in a manner which can no longer be seen as the result of spontaneous logic of cooperative work relationships (as is still the case with labour based on machinery): in this instance, the material form taken on by the intellect in the framework of production is no longer the alienated intellect of the proletariat – its ability to work and organize – but rather the outcome of deliberate scientification. The scientific intellect does not therefore have a merely alienated proletarian origin (such that it could be reclaimed) but is indifferent to working class consciousness from the outset. In contrast to the alienated proletarian intellect of engineers and mechanics, the intellect of the laboratory scientist is haute-bourgeois in origin, even if this difference itself tends to break down through the growing industrialization of scientific and technological work; in other words, the scientific division of labour is leading to a dequalification of scientific work. Once numerical and data processing has passed through a corresponding development, giving rise to a fixed structure of partial operations in scientific activity, the qualifications of the scientist will almost totally lose their current form of the scientist's own quasi-handicraft private property. Research and discovery will be impossible without real control over private property in the 'means of thought'. The proletarianization of the scientific intelligentsia will then only be delayed through wage differentials and privileges.

The step from mechanization, via regulation, to automation could, for precisely this reason, contain the possibility of bringing the proletarian and scientific intellects together – not by the student or academic intelligentsia taking on an apparent proletarian character, but through a genuine critique of the politico-economic structures of scientific and technological forms of understanding. This involves not merely a critique of the ruling class, but also, in fact primarily, a critique of 'objective technical dictates', the universal social pressure for efficient performance exerted by capital in the frozen form of the perpetuation of its class-determined division of labour. The contradiction to the rapid change in the capitalist division of labour which simultaneously retains class-specific occupations (i.e. technical change in the division of labour but social fixing of the asymmetrical distribution of the types of labour) appears in technical terms as the separation between the material and organizational aspect of

production, and in social terms as the irrational drive for constant retraining – needed to maintain strict separation of the training of the mind from the occupational application of previously acquired, but now redundant skills. Class structures should therefore be sought not only in the form of the ruling agents of the bourgeoisie, but also in the technically veiled forms of labour and their corresponding training in an abstract, subjectless logic of production. This logic is the source of that attitude which rejects domination in subjective terms, but at the same time accepts it in the form of expertise and objective necessity, e.g. in technological and terminological constraints, in the abstract drive for productivity and in bureaucratic and administrative exigencies, but chiefly in the destruction of people's ability to communicate and address each other in libidinous and emotive ways. These objective class pressures secure the persistence of traditional forms of bourgeois life and are able, in turn, to outlive the actual capitalist mode of production without undermining the basic structure of bourgeois society, i.e. the value form. In order to be able to assess this society's essential nature, it is necessary to turn from the phenomenal aspect of means, objects and conditions of the production processes to the fundamental structure re-produced therein: namely, the dual social form of the commodity-objects, a form which reveals their class character.

FORM AS IDENTIFICATION

It is difficult to evaluate the developmental forms of machinery since these forms produce their own fetishism. For example, on the surface no real distinction can be made between suitability (Zweckgemässheit) (which can be possessed by the characteristics of natural materials, although the actual use (Zweck) is a matter of complete indifference to them, only impinging upon them negatively, or, in Hegelian terms, as 'absolute susceptibility') and purposiveness (Zweckmässigkeit). The notion of 'suitability' is meant to express the indirect relation of a thing to the purposes of society; 'purposive', by contrast, denotes a direct relation. Whereas nature remains an external moment to the aim for which it is appropriated, technology is always 'internal' to the aim, i.e. functionally appropriate: as a means, technology is accommodated and tailored to the ends. The purposive object may have 'natural material' as an underlying substrate; however, this figures in forms that must in general be regarded as 'technology', that is, as a 'purely' social creation. If the 'material' or 'matter' expresses the form of nature in itself, then the 'content' expresses the form produced, characterized by and characterizing the material.

Machinery is nature in suitable form, i.e. the natural materials offer their forms, as it were, so that 'nature-given form' can become form for something else, namely, social requirements: sheer nature-given form dissolves and becomes the ground for social form. On the other hand, 'machinery' is purposiveness, created and produced by human beings, and to this extent its form is a purely social product since it cannot be found in nature. And yet, this form must simultaneously be available in nature since the social form of purposiveness must be expressed in a suitable natural material; otherwise, it would remain sheer want, unfulfilled human need. To this extent, an electrically driven lathe for cutting threads is a 'nature-given form' based on natural characteristics. However, this unity is not maintained: the cutter becomes worn during use, i.e. the nature-given form forcibly asserts itself against its purposive social form as soon as the machine, as purposive basis, itself 'produces' use-values. The cutter also becomes obsolescent, i.e. its social form can, under certain quite specific social relations of production, assert itself forcibly against the former unity of suitable and purposive form. In this case, the inner structure, as objective social form, shatters the external unity, which we shall term the technologically superseded shape of an indirect use-value. The machine, which in itself is contradictory, can only possess the unity of dual social form and nature-given form through its functioning and in the historical form of its development; and yet, the by-product of the latter is precisely the break-up of this unity.

The shortcoming of these observations is that a number of factors had to be introduced and posited externally; Marx himself bemoaned the lack of a rigorous history of technology, which – in contrast to the abstract materialism of the natural sciences – would have presented the genesis of the active relation between human beings and nature. Such a history is still lacking, which explains why the real historical movement and the generation of relations of form cannot simultaneously provide us with the coining of their concepts. Marx was most sensitive to this gap on the question of the genesis of constant capital, where he was repeatedly obliged to assume certain forms of the instruments of use in the production process. Up to now, machinery as result, as purposive instrument of use for the production of objects of use, has always been abstractly counterposed (in critiques of technology) to machinery as constant capital for the simple utilization of labour power and the extension of surplus labour time. This has been so despite the fact that the two aspects develop in a real unity that arises and passes.

To forestall and conceptual confusion, we should note that as a 'means' (Mittel), namely means of labour, machinery is simply "a means for producing-surplus value"; machinery is not a 'means' in the sense of a use value for the creation of use values, since the 'mean term' or 'mediation' (Vermittlung) is precisely the labouring subject (which alone can organize and set 'means' in motion to attain ends) and not the machinery itself; the latter simply provides the purposive basis for this mediation. What exists as 'means' for capital is simply the purposive basic condition for extending the working day, and for the social labour process machinery is in turn a 'means' for creating use values. Yet, it is only for the subject who determines end-purposes that machinery is truly a means, namely, for the unilateral appropriation of objects of use; meanwhile, to the workers, machinery is simply the abstract basis for the realization of alien ends, in order to maintain their own existence.

Hence, machinery is not only characterized by the dual character of nature-given and social form; its social form too has a dual character, which we term 'class structure'. As a social form, it first has the shape of a suitable means for appropriating surplus labour; to this extent, machinery is only machinery when in uninterrupted motion. On the other hand, it has the abstract shape, which only asserts itself indirectly through an inversion of the means-end relationship, of a purposive condition for producing use

values whenever called upon to do so by social requirements. In this form, which asserts itself more deviously, machinery would be machinery only when not directly in motion, but merely available for use at any time. That distinguishing these two social forms of machinery is not mere hair-splitting is 'proven' in any crisis of overproduction, where each form works forcibly against the other.

The historical development of machinery has not only taken place within the contradiction between natural and social form; in addition, class society produces a dual, contradictory social form of machinery as value and as instrument of use. Under the conditions of commodity production, the inner structure of machinery as nature-given form develops simultaneously as both a form of use value and a form of value. The value-form must therefore be 'visible' as one of its moments. Thus, machinery 'at rest' does not express its character of availability on demand (as in the case of an empty road), but will always be the result either of its natural and historical wear, or the recoil effect of a crisis of overproduction. It is therefore precisely that side of machinery's social form that makes it a means for satisfying social needs which, under the conditions of the capitalist world market, serves to reflect possible economic crises.

One of the effects of the atrophy of Marx's critique of political economy into 'Marxist Economics' has been that insufficient attention is paid to the social form of use value qua means of labour. Not only – in Sohn-Rethel's appropriate formulation – has Marxism remained idealist vis-à-vis the natural sciences, but more so, and with more serious consequences, as regards the conceptual treatment of technology. This applies in particular to the means of production, which the political economist always views in the same light as that in which they were planned and designed by the engineer, i.e. purely instrumentally. However, a 'pure' instrument, i.e. an instrument unrelated to any specific purposes, would merely be an aesthetic object and not an instrument at all: it would be nothing more than abstract functioning, and this is precisely the value-form-in-process, frozen into a nature-given form. As far as the engineer is concerned, machinery, as a blue-print, wears out neither naturally nor socially; it appears neither as a means of production of surplus value, nor as a the possible basis of a crisis of overproduction. The engineer considers only the most abstract form of its purposiveness: it must 'work'. But at the same time, the engineer is oblivious to the fact that this very conception corresponds exactly to the value-form of the intended machinery.

As we have already mentioned, there is no direct cause-effect relation between machinery as nature-given form, as instrument of use, and in the form of constant capital, since the change in form is effected by different subjects. The question is: what mediates these different, mutually contradictory forms, and where is the ground within which we can locate their determining characteristics? As Marx only gave a brief examination of this possibility of an inner connection of different characteristic forms, we intend to follow up and emphasize this connection. In *A Contribution to the Critique of Political Economy*, where this question is more prominent, Marx writes: "use value as an aspect of the commodity coincides with the physical palpable existence of the commodity." However, they can only 'coincide' in the result because they have first to be differentiated and then reunited in the process of labour. But even as a finished object, available for sale or exchange, the commodity requires a specific form of mediation between its use value (as the simple unity of nature-given form and purposive form) and its possible exchange value; Marx succinctly designated this form of mediation as the 'sensuous measures' of the commodity objects.

Measures (*Masse*) are quantitative relations (such as numbered items, spatial extension and weight) as social qualities of objects; viewed historically, they are for the most part elements of previously valid specific measures of value, 'particular equivalent forms' which were unable, for a variety of reasons, to evolve further into the general form of value. For example, scales in conjunction with the standardized poundal (*Kilopond*) as possible equivalent represent, as it were, an uncompleted development towards the money form (not all objects, as possible commodities, could be weighed). Nevertheless, the iron weight retained its social 'standardization' (its particular equivalent form) as a unit of measure, enabling relative value-magnitude to appear in a completely abstract form – namely, as the expression of a quantum of labour time – in the first place. Measures constitute the quantitatively distinguishable qualities of commodity objects as sheer amounts: number, length, area, space and weight. For the most part, these commodity measures are only 'relations' in themselves: the determinations of measurement rarely confront the commodities in reality. The sale of commodities means that they already ideally possess their particular measure as amounts, since price is the form of their equalization with those measures. The appearance of the magnitude of value as relative, quantitatively determined value-form expresses the fact that the magnitude of value appears in the particular relations of the commodities' measures: five bushels of wheat are worth two yards of cloth, i.e. a specified amount of specific volume units of wheat are made equal to a specified amount of specific area units of cloth. The commodity form thus accomplishes the paradox of equalizing relations of measurement which are utterly different socially: volume = area. Furthermore, it is only in such relations of measurement that the magnitude of value appears at all; they are its specific form.

Although the poundal itself only allows an abstract type of value-equality, tied to the nature-given form of the object (e.g. corn and wine, but not cattle and wheat, where the measure of weight is impracticable as a basis for equalization), the development of the value-form itself creates social forms of things that make possible the development of the price form of commodities. The value of a commodity always appears in the heterogeneous relation of two unit measures of specified amount; the equalization of different amounts therefore creates the form of the common element underlying this relation, a time-measured magnitude representing a quantum of labour. The form in question is the value-form. This also applies once commodities cease being exchanged and are bought and sold; one unit of measurement is hidden in the price form (the former measures in weight of gold as the 'standard of price'), the other unit of measurement is hidden in the expression of the amount of the commodity which has

received its price. This relation is expressed, somewhat unclearly, in Marx's notion of the 'natural form' which becomes the value-form of precisely that commodity whose natural form it is not. If 'natural form' is understood as the social unity of nature-given form and useful form, the concept is spot-on; however, if it is understood solely in terms of the nature-given aspect of the object of use (or commodity-object), the expression is incorrect, since the value-form is reflected in the unity (expressed as amount and measure) of nature-given form and useful form. Only thus is it possible to appreciate the way in which the fetishism of the commodity is brought to completion: there is nothing mysterious in the fact that people 'reify', or objectify their living relations in the process of 'socializing' properties of nature. I shall therefore retain the distinction of nature-given form (Naturform) and useful form (Gebrauchsform), and employ the notion of 'natural form' (Naturalform) to express their negative unity. This is because the determinate amounts of commodities (i.e. amounts which could only be 'determined' by recourse to units of measurement in the first place) are relational forms that are as 'purely' social as is the form of the magnitude of value in its visible shape as the money form of commodities.

Initially, commodities are produced not as definite measures (which, like volume for example, usually originated in the sphere of consumption, the practical circumstances of the use of various objects), but rather as indeterminate amounts (Menger). It is only the determination of value which requires already existing characteristics to become the quality of specific quantitative forms, i.e. to become measures. Weights, spatial areas, and numbers, which through unit measures become a definite measure-magnitude, first arise, as intelligible forms of commodity objects, in the value-relation itself; prior to this, even in production, the 'sensuous' measures are merely indeterminate amounts of products, i.e. simple magnitudes. Clearly, the nature-given forms remain the abstract, but not completely indeterminate phenomenal substrate of the commodity measures.

Commodities are produced in definite amounts, in the form of a quantitative determinacy which makes it possible to exchange and buy commodities as 'measured' amounts. In the conscious production of values characteristic of capitalism, these intelligible forms of the commodity ('intelligible' because these forms, like the price form, only exist through the 'understanding' of symbols, not through the sensuous perception of qualities) become forms of the commodity-object 'within' production. The operational planning of production expresses this through the fact that it no longer produces amounts in general, but, based on experience in the market, has to produce more or less precisely specified amounts; and since the division of labour means that the output of the factory no longer constitutes a complete use value but rather a fragment of a use value requiring the mediation of the market, these elements must assume measures which guarantee that they can be repeatedly assembled into a complete use value. The basis of these measures of the product lies in the 'sensuous' measures of the commodity. Hence, the determination of the amounts of commodities no longer takes place during exchange or sale, but is produced along with the commodity from the outset. These determinations enter into the plant-level development of new forms of use value: in the course of bourgeois society's development, use-values (produced as commodities) assume different forms, namely, inner value-forms. The object of use no longer corresponds merely to an appropriate relation between nature-given form and form for social need, i.e. purposive form; in addition, the object of use must, as a commodity, take on a second social form to render the object 'purposive' for exchange, for circulation as commodity capital and for the value relation in general. The foundations of this commodity-purposiveness were the 'sensuous' measures, commodities as qualitative amounts. These measures are now basic to all technical and scientific research activities and theoretical constructions; certain areas – in particular, electrical and chemical technology – required the invention of new units of measurement, most of which referred back, in an analogous and comparative way, to older geometrical and mechanical measures.

The unification of such measures plays an important role in the further development of capitalist relations of production, as can be seen in Britain's current conversion of metric standards. These units of measurement are also the condition for the possibility of unitary industrial standards, which can be regarded as units of measurement attached to technically specific nature-given forms of commodities as inner value forms. Historically, this commodity-purposiveness became the basis for 'rationalization', not only in the creation of industrial standards but also in work-organization. The concept of rationalization reveals what lies at the core of bourgeois value-rationality: namely, as the logical, seemingly uncontradictory thought-form of valorization's pure functioning. Presumably, it was this characteristic form of technological rationality, sinking down from the value relation to the actual production of commodities, that first struck Sohn-Rethel, but which he could only interpret as a 'reflection' of the commodity form in consciousness.

To summarize: the nature-given material of the commodity object must assume a purposive form not only for use but also for exchange. In turn, this latter form functions blindly as the condition for the possibility of more 'rational' forms, i.e. plays a part within production by co-determining the further development of adequate use-value forms for the products. The 'uniform motion' of machinery itself accommodated the creation of an 'inner value-form' of the commodity objects (as mutually equal), just as machine motion itself expresses the 'inner value-form' of the means of production as process. The equivalency of the various commodities' amounts become their actual equality. The fact that these distinctions of form are no mere hair-splitting is shown in all those conflicts which arise between product planners and technicians on the one hand, and the factory's purchase and sales department on the other.

In my opinion, the dual social form necessarily assumed by the commodity provides us with a genetic explanation of abstract-categorical thought-forms that has more of a foundation in reality than Sohn-Rethel's arguments can have. The latter are ambiguous: on the one hand, thought-forms 'arise' from acts of exchange, a point which merely leaves us with an unanswered

riddle; on the other hand, he interpolates an unspecified act of reflection between thought-form and commodity-form. Yet, the reflection of one form in another medium presupposes that very understanding which compares the real and reflected forms with one another in order to arrive at a judgement as to their formal identity. Certain forms of the social intellect are just as much products as determining moments of the universalization of value; they cannot be conceived either as merely 'presupposed' (as in Schelling) or as simply 'derived' (as in empiricism, to which Sohn-Rethel in the final analysis belongs). The amount of the commodity can only express itself as quantitatively determined value-relation if these determinate amounts assume a peculiar additional nature-given form (either a very abstract form, like weight or extension, or a readily intelligible form, like number) and thereby become determinable relations of measurement, which are in turn the pre-conditions of the appearance of value; by becoming measures the amount of the commodity is abstract vis-à-vis the direct form of use value, but conditions the specific historical 'identification' of the directly natural use-form of commodities and their value-form. Without the activity of the understanding, the ideal form of the measure of value qua price-form could neither develop nor persist. A specific aspect of the understanding turns into a moment of the value-form and becomes one – but only one – of the constitutive pre-conditions of money, and hence of capital. Otherwise, one could never speak of the commodity's value-objectivity as 'sensuously supra-sensuous' (sinnlich übersinnlich).

For the remainder, we shall further narrow down the problem to the commodity objects in their capacity as material elements in the immediate production-process. Here, Marx specifies the results of the genetic form mentioned above: he formulates the dual social form in terms of the unity of means of production and 'means of valorization' i.e. constant capital encompassed within the concept of the means of production. We have already stated that this dual social form – structure and shape in the process of their mutual exclusion and identification as function – was the precondition for developing 'means of labour' which are no longer means for the worker but means for valorization, i.e. merely the purposive condition for the utilization of a social unit of labour power, or of labour power qua social. Machinery now possesses use-value form only in relation to society in the abstract (as capital); concretely, in relation to the individual worker, it only has the one-sidedly abstract social form of being 'value' in itself. It has the form of simple 'value', value for the production of things which somehow have utility. In the consciousness of the workers, 'value' becomes established as a scarcely differentiated contradictory unity of use value and abstract value. To say the machine has 'value' means that it has a significance, a validity, as a relation of labour and as a 'ware' (Gut). Although still unclear, proletarian consciousness reveals an understanding of the fundamental distinction between the two social forms of machinery – witness the history of machine-wrecking. However, it is for the political understanding of the proletariat to posit the specific means of each, so as, on the one hand, to be able to theoretically 'reconstruct' machinery in its role of a 'useful object' for the production of useful objects, and, on the other hand, to thereby be able to grasp machinery as capitalist private property for the extraction of surplus-values. Since machinery, and, even more so, apparatuses and technologies as nature-given forms, have in various occupations forfeited their elementary sensuousness, i.e. their character as means of labour, their meaning cannot be grasped through perception but only through an abstract political understanding qua critique of those relations.

The socially determined dual form existing as machinery or as means of production in general causes certain structures of the class-based division of labour to become frozen, whereas others are revolutionized; in general, it mediates the unequal types of social labour and maintains them in such a way that 'plant rationality', the mathematical division of labour within the factory, constitutes the irrationality of the individual's labour. It is sheer chance whether an individual labours with no opportunity for communication, or whether there may still be a limited possibility for developing an interest in changes in working conditions and work tasks. In general, 'interest' as such is banished to the pure sphere of reproduction. The logic of the technological development of labour is employed against the direct needs of the proletariat as working individuals; this can be seen from any empirical study – for example, how automation is introduced in precisely those areas of production which are in fact the least stupefying. Only as a whole, in abstract totality, does reason blindly assert itself in the "increase of the constant constituent of capital at the expense of its variable constituent", i.e. in the one-sided, subjectless alteration in the technical composition of capital. Only the 'subjectification' of the material foundations of social production would mean the creation of a social subject. The second, abstractly social aspect of form as the means of production's inner value-form is the active aspect; the aspect of the means of production as directly useful can only assert itself in opposition to the latter.

The dual social form of the object in production is hence the 'ground' of this society in two ways. First, machinery is the basis of the dominance of one class over another: it establishes the proletariat as such; second, it is the basis of the societation of labour processes precisely by virtue of the development of an 'inner value-form' of the means of production. This is the locus of the rationality of the social structure of production, through which direct forms of use value are destroyed and the mediation are destroyed and the mediation is no longer effected through the spontaneous agency of the individual, but through society in general. Hence, machinery and technology establish the developing existence of society as subject, in the sense of the requisite level of the productive forces. However, in contrast to Marx's own period, this dual basis no longer asserts itself through a spontaneous mediation of classes; rather, this process of mediation is itself a product of the scientific and technical intellect. The "scientifically arranged process of production" must be investigated in terms of this 'arrangement'. It is no use merely presupposing this intellect as mysteriously antecedent to capital and then confirming that the result of scientific and technological research are appropriated and used by capital; this does not explain the specific form of development of that intellect.

As Grossmann's critique of Borkenau indicates, at the surface level it is not so much that the deductive form of thought sets its

stamp on mechanics (the basic form of machinery), as the other way round: mechanisms and mechanical-dynamic structures set their stamp on the specifically deductive form of thought by supplying the understanding, in sensuous terms, with the abstract, naturo-analytic form as its material, as the content of formal thought. The 'whole' is given a priori, albeit in a social form which simultaneously provides the 'knowledge' that the whole is analytic (in the sense that the apparatus, say a mechanism or gear-system, is previously assembled from parts). Theoretical deduction presupposes practical mechanical synthesis; fundamental principles are given, not merely as 'intuition' but as conclusive 'evidence'. At the same time, in the functioning of the mechanical works, the system should be constructed 'free of contradictions'. On the other hand, should the functioning cease, then deduction directly becomes theoretical analysis (theoretische Analytik), i.e. if repair work is initiated, or further development is undertaken on forms of use which have ceased, or appear to have ceased, to be purposive.

The empirical-analytic form of thought (conceived in philosophy, for example, as the prior intelligibility of perception and intuition) presupposes deduction as a 'functioning whole', just as deduction presupposes practical-active analysis, i.e. division of labour. However, it is not until they become an element in the capitalist production of commodities that logical necessity and certainty, as requisites of the functioning of mechanics, are stripped of their character of mere need, mere want. Although the system of gears and mechanisms may previously have been more or less purposive to labour, in capitalist production their functioning becomes an absolute necessity, and repair or crisis is inevitably the contradiction (as shortcoming and loss) of profit. Consequently, the dual social form of the mechanical means of production is first expressed in the category of 'regularity', but in advance commodity production as 'causality', i.e. the necessary, coercive relation of cause and effect. Traditional logic anticipated technology, just as commercial capital anticipated industrial capital.

The technical relations which are developed (not merely reflected) in the social understanding – materially, as the functional nexus in machinery and technology of use-form and value-form – finally achieves its subjective form (for the mediation of capital and labour) in the shape of the technical intelligentsia. On the other hand, this autonomy is in turn the presupposition for the dual social form to set its stamp on the nature-given form of 'brain'. As a moment of use value, the intellect is tied to matter; as deductive, discursive logic, its material production of knowledge achieves an abstract independence (expressed in institutional terms as training at the levels of primary, technical and higher education). At the same time, this is the presupposition for industrialization of the social dissemination of the knowledge required for production and for the production of knowledge itself; i.e. it is the presupposition for the separation of the means of thought (laboratories, libraries, data processing machines, etc.) and thought-power (Denkkraft) itself. This is the signal for the real societation of the understanding, which, under the conditions of bourgeois society, can only be achieved via the detour of the dequalification of individual thinking, i.e. via the manufactured stultification and artificial stupefaction of those layers of the intelligentsia which used to be creators and carriers of culture. Doubts that human development will survive this passage through the 'de-utopianization' of life (as a precondition for its brutalization generally) are too widespread to be written off just as an ideology of bourgeois downfall based on cultural pessimism. This is why it is all the more important to recognize the class dictates (which becomes interest-free and sublimated in the technological division of labour) for the structure that they really are, namely, 'the inner value-form of things'.

However, in contrast to ideology, the fetish character of the 'inner value-form' of the means of production is necessary for the continuing development – analogous to the way in which the results of the mathematical operation have to disappear into the formula before the latter can provide the basis for more complex relations to be calculated. And precisely because the genesis of the technological development must disappear in the result, proletarian consciousness hardens into a false, ahistorical immediacy. The illusion develops that the individual tool, machine, apparatus, in fact the entire technology of the production process, is always a means, always an instrument, which in itself anyone can appropriate and use. The weapon or tool appears to have the same form – in terms of structure and shape – in the hands of the oppressed as it does in the hands of the oppressor, although the goals may have changed drastically. The functioning, mediating instrument seems completely indifferent to its two extremes – bourgeois private property and proletarian labour – although in the final analysis it is this mediation alone that can link the two classes, since in the long run sheer political-military force is not an adequate basis for maintaining social cohesion in a system of production. This is the source of the increasingly revolutionary role of the scientific-technical intelligentsia as the subjective side of this fateful mediation of classes; this intelligentsia both co-founds the link between classes, as well as having its own existence within this mediation.

The reason why the surface appearance of the means of production is dominated by the semblance of indifference is to be found in the fact that in industrial production the living dialectic of the material interaction with nature is no longer experienced, if for no other reason than that, as far as the workers are concerned, the means used to work upon nature-given material are simply the conditions for their abstract activity. The construction of particular ploughs and looms revealed both the social existence of the peasant and handicraft workers of a particular historical epoch as class-specific occupations, as well as the basis and degree of societation of this agrarian and handicraft form of production. The class, as an occupational estate, existed simultaneously in the natural form of its means of labour. *It was only with the separation of the worker from the means of production, and the mediation of this development of the (constantly evolving) means of production of the worker via the activity of the intellect, that the means of labour assumed a historical form which no longer corresponded to the individual's activity. The paradox is that although machinery and technology were created as the purposive basis of bourgeois class rule, they appear as their opposite in the social mediation of individual capitals through the market: that is, they appear as a neutral, indifferent basis for the societation of the production process through the division of labour. They appear specifically 'class neutral', particularly in*

comparison to objects from the sphere of consumption, where cars, home furnishing, fancy packaging and buildings still directly exhibit both forms of their social nature, namely, utility and domination. By contrast, the highest stage of the developmental forms of the means of production, as 'rationality of the inner value-form', produces the opposite appearance: the melancholic sameness of proletarian working conditions vaunts itself as the 'transcendence of class society', for the simple reason that capital, as 'inner social value-form of the means of production', presents itself abstractly as the latter's societal nature and universal validity: in fact, as society-in-itself, taking on material shape as the universally valid coercion characterizing labour conditions.

This novel semblance may be the reason why there has been no machine-wrecking in the 20th century, even though the same class relations of production are manifested, albeit in a subjectless form, in this system of machinery and technology. Machine-wrecking has today turned into its opposite: 'machinolatry'. The critique of the genesis of these socially dual, class-specific characteristic forms now has the task of calling the mechanisms of this fetishism by their real name.

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